



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 29

[Docket No.FAA-2017-1127; Notice No. 29-044-SC]

Special Conditions: Bell Helicopter Textron, Inc. (BHTI), Model 525 Helicopters; Flight Envelope Protection

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for the BHTI Model 525 helicopter. This helicopter will have a novel or unusual design feature associated with fly-by-wire flight control system (FBW FCS) flight envelope protection. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Send your comments on or before **[insert date 45 days after date of publication in the Federal Register]**.

ADDRESSES: Send comments identified by docket number [FAA-2017-1127] using any of the following methods:

- ☐ Federal eRegulations Portal: Go to <http://www.regulations.gov> and follow the online instructions for sending your comments electronically.

- Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.
- Hand Delivery of Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, S.E., Washington, D.C., between 8 a.m., and 5 p.m., Monday through Friday, except Federal holidays.
- Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov>, including any personal information the commenter provides. Using the search function of the docket website, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 9 a.m., and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: George Harrum, Aerospace Engineer, FAA, Rotorcraft Standards Branch, Policy and Innovation Division, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-4087; email George.Harrum@faa.gov.

SUPPLEMENTARY INFORMATION:

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive on or before the closing date for comments.

We will consider comments filed late if it is possible to do so without incurring expense or delay.

We may change these special conditions based on the comments we receive.

Background

On December 15, 2011, BHTI applied for a type certificate for a new transport category helicopter designated as the Model 525. The Model 525 is a medium twin-engine rotorcraft. The design maximum takeoff weight is 20,500 pounds, with a maximum capacity of 19 passengers and a crew of 2.

The BHTI Model 525 helicopter will be equipped with a four axis full authority digital FBW FCS that provides for aircraft control through pilot input and coupled flight director modes. The FBW FCS will contain an advanced flight control system that will alter the nominal flight control laws to ensure that the aircraft remains in a predetermined flight envelope. These Flight Envelope Protection (FEP) features prevent the pilot or autopilot functions from making control commands that would force the aircraft to exceed its structural, aerodynamic, or operating limits. The design and construction standards, specifically 14 CFR 29.779(a), require that movement of the flight controls results in a corresponding sense of aircraft motion in the same axis. The airworthiness standards for an automatic pilot system in § 29.1329 covers design

requirements for basic operation of the system but does not address dynamic flight envelope limitations imposed by the automatic pilot system. Currently there are no specific airworthiness requirements that address FBW FCS FEP in rotorcraft. The proposed special conditions will require the minimum safety standard for the FEP features.

Type Certification Basis

Under the provisions of 14 CFR 21.17, BHTI must show that the Model 525 helicopter meets the applicable provisions of part 29, as amended by Amendment 29-1 through 29-55 thereto. The BHTI Model 525 certification basis date is December 31, 2013, the effective date of application to the FAA.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 29) do not contain adequate or appropriate safety standards for the BHTI Model 525 because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the BHTI Model 525 helicopter must comply with the noise certification requirements of 14 CFR part 36, and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The BHTI Model 525 helicopter will incorporate the following novel or unusual design features: FBW FCS incorporating FEP features. FEP is used to prevent the pilot or an autopilot from making control commands that would force the rotorcraft to exceed its structural, aerodynamic, or operating limits. To accomplish this envelope limiting, the FCS control laws change as the limit is approached or exceeded.

Discussion

The proposed special conditions will require the minimum safety standard for the flight envelope protection features. The FEP features must meet requirements for handling qualities, compatibility of flight parameter limit values, response to dynamic maneuvering, and failure modes.

Applicability

As discussed above, these special conditions are applicable to the BHTI Model 525 helicopter. Should BHTI apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on one model of rotorcraft. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 29

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Bell Helicopter Textron, Inc., Model 525 helicopters:

Flight Envelope Protection.

The Flight Envelope Protection (FEP) features of the FCS must meet the following requirements:

- a. Onset characteristics of each envelope protection feature must be smooth, appropriate to the phase of flight and type of maneuver, and not in conflict with the ability of the pilot to satisfactorily change rotorcraft flight path, speed, or attitude within the approved flight envelope.
- b. Limit values of protected flight parameters (and if applicable, associated warning thresholds) must be compatible with:
 1. Rotorcraft structural limits;
 2. Safe and controllable maneuvering of the rotorcraft;
 3. Margins to critical conditions. Dynamic maneuvering, airframe and system tolerances (both manufacturing and in-service), and non-steady atmospheric conditions—in any appropriate combination and phase of flight—must not result in a limited flight parameter beyond the nominal design limit value that would cause unsafe flight characteristics;
 4. Rotor rotational speed limits;
 5. Blade stall limits; and

- 6. Engine and transmission torque limits.
- c. The aircraft must be responsive to pilot-commanded dynamic maneuvering within a suitable range of the parameter limits that define the approved flight envelope.
- d. The FEP system must not create unusual or adverse flight characteristics when atmospheric conditions or unintentional pilot action causes the approved flight envelope to be exceeded.
- e. When simultaneous envelope limiting is active, adverse coupling or adverse priority must not result.
- f. Following a single FEP failure shown to not be extremely improbable, the rotorcraft must:
 - 1. Be capable of continued safe flight and landing;
 - 2. Be capable of initial counteraction of malfunctions without requiring exceptional pilot skill or strength;
 - 3. Be controllable and maneuverable when operated with a degraded FCS, within a practical flight envelope identified in the Rotorcraft Flight Manual;
 - 4. Be capable of prolonged instrument flight without requiring exceptional pilot skill;
 - 5. Meet the controllability and maneuverability requirements of 14 CFR part 29 Subpart B throughout a practical flight envelope; and
 - 6. Be safely controllable following any additional failure or malfunction shown to not be extremely improbable occurring within the approved flight envelope.

Issued in Fort Worth, Texas on May 24, 2018.

Jorge Castillo,
Acting Manager, Rotorcraft Standards Branch,
Policy and Innovation Division,
Aircraft Certification Services.

[FR Doc. 2018-12077 Filed: 6/5/2018 8:45 am; Publication Date: 6/6/2018]